IFAC
INTERNATIONAL FEDERATION OF AUTOMATIC CONTROL

CAMS 2021 • Program

Day 1 • Sept 22nd, 2021

10.00 - 10.30	**Opening:** Prof. Dr.-Ing. Axel Hahn & Prof. Dr.-Ing. Torsten Jeinsch			
10.30 - 11.00	Dr.-Ing. Jeronimo Dzaack: **"Multi-Domain Unmanned Maritime Systems"** (Keynote 1)			
11.00 - 11.30	Prof. Dr.-Ing. Peter Liggesmeyer: **"Autonomics: A New Scientific Discipline?"** (Keynote 2)			
	Break			
12.00 - 14.00	**Autonomous and remotely operated (surface and underwater) marine vessels (1)**		**Control in marine systems (1)**	
12.00 - 12.20	Object Detection at Sea Using Ensemble Methods Across Spectral Ranges	Frederik Emil Thorsson Schöller, Martin Plenge-Feidenhans'l, Jonathan Dyssel Stets, Mogens Blanke	A Culling Procedure for Collision Avoidance Model Predictive Control with Application to Ship Autopilot Models	Simon Helling, Thomas Meurer
12.20 - 12.40	Combining Supervised Learning and Digital Twin for Autonomous Path-planning	Chanjei Vasanthan, Dong Trong Nguyen	Trajectory Tracking of a Fully-actuated Surface Vessel using Nonlinear Model Predictive Control	Leticia Mayumi Kinjo, Stefan Wirtensohn, Johannes Reuter, Tomas Ménard, Olivier Gehan
12.40 - 13.00	Proactive Collision Avoidance for Autonomous Ships: Leveraging Machine Learning to Emulate Situation Awareness	Brian Murray, Lokukaluge Prasad Perera	Design of Fractional-Order Predictive PI Controller for Real-time Pressure Process Plant	Devan P. Arun Mozhi, Hussin Fawnizu Azmadi, Ibrahim Rosdiazli, Bingi Kishore, Abdulrab Hakim
13.00 - 13.20	COLREG-compliant ship collision avoidance in narrow channels using curvilinear coordinates	Yonghoon Cho, Jonghwi Kim, Jinwhan Kim	Trajectory Control for Autonomous Ship using Model Predictive Control	Victor Chacon Codesseira, Eduardo Aoun Tannuri
13.20 - 13.40	Open Water Detection for Autonomous In-harbor Navigation Using a Classification Network	Martin Plenge-Feidenhans'l, Mogens Blanke	Adaptive Backstepping Control of Ship Speed Tracking and Hybrid Mode Selection	Fan Gao, Astrid H Brodtkorb, Sigrid Marie Mo, Zhengru Ren, Asgeir Soerensen
13.40 - 14.00	An implementable architecture of inland autonomous waterway transportation system	hualong chen, Man Zhu, Yuanqiao Wen, Changshi Xiao, Axel Hahn	Wind Affected Maneuverability of Tugboat-Controlled Ships	Maria Höffmann, Sylvain Roy, Arne Berger, Wiebke Bergmann, Kai Wah Chan, Mahmood Shubbak, Johannes Langhorst, Tim Schnauder, Olaf Struß, Christof Büskens
	Break			

14.30 - 16.30	Intelligence and autonomy in marine systems and operations		Dynamic positioning systems for ships & platforms	
14.30 - 14.50	Deep Learning based Detection, Segmentation and Counting of Benthic Megafauna in Unconstrained Underwater Environments	Mona Lütjens, Harald Sternberg	Pendulation control for dynamical positioning capable ship; considerations on actuator usage	Bas de Kruif, Bruno Rossin
14.50 - 15.10	Trajectory Prediction for Marine Vesselsusing Historical AIS Heatmaps and LongShort-Term Memory Networks	Frederik Emil Thorsson Schöller, Thomas Thuesen Enevoldsen, Jonathan Binner Becktor, Peter Nicholas Hansen	An Approach to QP-based Thrust Allocation considering Inflow	Philipp Koschorrek, Martin Kosch
15.10 - 15.30	A Concept of Autonomous Waterborne Transportation Systems and its Simulation	Wei Tao, Yuanqiao Wen, Yamin Huang, Man Zhu, hualong chen, Changshi Xiao	Deep Integration of INS and DP: from Theory to Experiments	Elena Ambrosovskaya, Dmitry Romaev, Anton V. Proskurnikov, Andrey Loginov, Alexander Mordvintsev, Alexander Miroshnikov, Igor Fedorov
15.30 - 15.50	Determination of AIS Position Accuracy and Evaluation of Reconstruction Methods for Maritime Observation Data	Dennis Jankowski, Arne Lamm, Axel Hahn	Tightly Coupled INS/GNSS Navigation Filter for the Automation of a River Ferry	Maximilian Nitsch, Jan-Jöran Gehrt, René Zweigel, Dirk Abel
15.50 - 16.10	Anomaly detection in maritime machinery with unknown anomalies	Katarzyna Michałowska, Signe Riemer-Sørensen, Camilla Sterud, Ole Magnus Hjellset	Explainable AI methods on a deep reinforcement learning agent for automatic docking	Jakob Løver, Vilde Benoni Gjærum, Anastasios M. Lekkas
16.10 - 16.30	Maintaining safety requirements of updated maritime surveillance systems	Georg Hake, Sebastian Vander Maelen, Axel Hahn	System Approach for Highly Automated Manoeuvring with Research Vessel DENEB	Carsten Rethfeldt, Agnes Schubert, Robert Damerius, Martin Kurowski, Torsten Jeinsch

Day 2 • Sept 23rd, 2021

10.00 - 10.30	Dr. Dirk Jürgens: **"Enhanced Dynamic Positioning Capability in Combination with Innovative Roll Stabilization"** (Keynote 3)			
10.30 - 11.00	Prof. Dr. Maarja Kruusmaa: **"State Estimation and Control of Small Low-cost AUVs"** (Keynote 4)			
	Break			
11.15 - 12.35	**Modeling and simulation of marine systems**		**Maritime Robotics**	
11.15 - 11.35	Deep Reinforcement Learning Based Controller for Active Heave Compensation	Shrenik Zinage, Abhilash Sharma Somayajula	Experimental Validation of a Nonlinear Wave Encounter Frequency Estimator Onboard a Wave-Propelled USV	Alberto Dallolio, Jo Arve Alfredsen, Thor I. Fossen, Tor Arne Johansen
11.35 - 11.55	Performance Comparison of Two Statistical Parametric Methods for Outlier Detection and Correction	Nimish Jain, Shraddha Suman, B Prusty	Grounding-aware RRT* for Path Planning and Safe Navigation of Marine Crafts in Confined Waters	Thomas Thuesen Enevoldsen, Roberto Galeazzi
11.55 - 12.15	An Identification Scheme to determine All Off-Diagonal Elements of Added-Mass Matrix for Marine Vessels	Tobias Hahn, Robert Damerius, Torsten Jeinsch	Adaptive Integral Terminal Sliding Mode Control for an Unmanned Surface Vehicle Against External Disturbances	Alejandro Gonzalez-Garcia, Herman Castañeda
12.15 - 12.35	Development of a Life-cycle Cost Framework for Retrofitting Marine Engines towards Emission Reduction in Shipping	Khanh Bui, Lokukaluge Prasad Perera, Jan Emblemsvag		
	Break			
13.00 - 14.20	**Remote access, development and exploitation - A new era of advancements (1)**		**Control in marine systems (2)**	
13.00 - 13.20	Cooperative Distributed Navigation, Guidance, and Control Systems for Autonomous Surface Vehicles with Different Physical Connections	Johanna Noria Brecher, Enrica Zereik, Marco Bibuli, Matthias Loth, Thomas Glotzbach	3D Space Trajectory Tracking of Underactuated AUVs using Back-Stepping Control and Time Delay Estimation	Gun Rae Cho, Hyungjoo Kang, Mun-Jik Lee, Min-Gyu Kim, Ji-Hong Li
13.20 - 13.40	Cooperative single-beacon multiple AUV navigation under stringent communication bandwidth constraints	Francisco Rego, Antonio M. Pascoal	Predictive Path Following and Collision Avoidance of Autonomous Vessels in Narrow Channels	Mohamed Abdelaal, Axel Hahn

13.40 - 14.00	Autonomous Surface Vessel with Remote Human on the Loop: System Design for STCW Compliance	Kjeld Dittmann, Peter Nicholas Hansen, Dimitrios Papageorgiou, Signe Jensen, Marie Lützen, Mogens Blanke	A Real-Time NMPC Guidance Law and Robust Control for an Autonomous Surface Vehicle	Ivana Collado-Gonzalez, Alejandro Gonzalez-Garcia, Carlos Sotelo, David Sotelo, Herman Castañeda
14.00 - 14.20	Cooperative Motion Control Using Hybrid Acoustic-Optical Communication Networks	Rodrigo Rego, Hung Nguyen, Antonio M. Pascoal	Norm-Based Robust Pitch Channel Control of an Autonomous Underwater Vehicle	Ravishankar Desai, Narayan Suresh Manjarekar
Break				
14.40 - 16.00	**Remote access, development and exploitation - A new era of advancements (2)**		**Control in marine systems (3)**	
14.40 - 15.00	A Kinetic Simulator For Distributed Mechanically Linked Marine Vehicles	Theresa Köster, Angelo Odetti, Matthias Loth, Thomas Glotzbach, Massimo Caccia	A 3DOF Path-Following Controller for a Non-Directionally Stable Vessel with Slow Thruster Dynamics	Emil Thyri, Glenn Ivan Bitar, Morten Breivik
15.20 - 15.40	Robust Underwater SLAM using Autonomous Relocalisation	Jonatan Scharff Willners, Yaniel Carreno, Shida Xu, Tomasz Luczynski, Sean Katagiri, Joshua Kenneth Roe, Èric Pairet Artau, Yvan Petillot, Sen Wang	Comparison of Advanced Control Strategies for Automated Docking	Stefan Wirtensohn, Oliver Hamburger, Hannes Homburger, Leticia Mayumi Kinjo, Johannes Reuter
15.40 - 16.00	Trajectory tracking SISO marine sampling systems with input and state delays	Karl von Ellenrieder		

Day 3 • Sept 24th, 2021

10.00 - 12.00	Guidance, navigation and control (GNC)		Control in marine systems (4)	
10.00 - 10.20	LPV-MPC Path Planner for Autonomous Underwater Vehicles	Luca Cavanini, Pawel Majecki, Michael Grimble, Hiroshi Uchihori, Mitsuhiko Tasaki, Ikuo Yamamoto	Robust structured H2 synthesis for linear systems subject to time-invariant uncertainties with global optimization	Dominique Monnet, Jordan Ninin, Benoit Clement
10.20 - 10.40	Maximum A Posteriori estimation for AUV localization with USBL measurements	Matteo Franchi, Alessandro Bucci, Leonardo Zacchini, Alessandro Ridolfi, Matteo Bresciani, Giovanni Peralta, Riccardo Costanzi	Disturbance-Observer-Based Model Predictive Control of Underwater Vehicle Manipulator Systems	Éverton L. de Oliveira
10.40 - 11.00	A Wall-following Controller Design Method for Underactuated AUVs: An Adaptive Internal Model Approach	Mohammadtaghi Ghorbani	Evaluation of Dynamic Coupling Intensity and Passive Attitude Control of Underwater Vehicle-Manipulator Systems	Éverton L. de Oliveira
11.00 - 11.20	Marine boundary layer tracking using an AUV with UKF based extremum seeking	Tim Benedikt von See, Thomas Meurer, Jens Greinert	Energy Efficient Control for Electric Ship Propulsion Considering Thrust Fluctuation in Regular Waves	Changyu Lee, Jinwhan Kim
11.20 - 11.40	Towards Optimal Motion Planning of Surface Vehicles in Confined Waters	Robert Damerius, Tobias Hahn, Torsten Jeinsch	Maneuvering with safety guarantees using control barrier functions	Mathias Marley, Roger Skjetne, Andrew R. Teel
11.40 - 12.00	Direct Adaptive Pole-Placement Controller using Deep Reinforcement Learning: Application to AUV	Thomas Chaffre, Gilles Le Chenadec, Karl Sammut, Estelle Chauveau, Benoit Clement	Switched Adaptive Scheme for Heading Control in Ships	Rudy Cepeda-Gomez, Jens Ladisch, Torsten Jeinsch, Wolfgang Drewelow
Break				

12.30 - 14.30	Autonomous and remotely operated (surface and underwater) marine vessels (2)		Sensors and Actuators in Marine Systems	
12.30 - 12.50	Multi-Vessel Cooperative Speed Regulation for Ship Manipulation in Towing Scenarios	Zhe Du, Rudy Negenborn, Vasso Reppa	A multi-camera system for the integrated documentation of Underwater Cultural Heritage of high structural complexity; The case study of M/S Helma wreck	Eleni Diamanti, Oyvind Odegard, Håvard Snefjellå Løvås, Martin Kvisvik Larsen
12.50 - 13.10	A Experimental Research Platform for Maritime Automation and Autonomous Surface Ship Applications	Fredrik Brushane, Kai Jämsä, Sebastien Lafond, Johan Lilius	Axial Force Measurements for a Towed Biolocomotion Emulator	Khanh Nguyen, Craig Woolsey, Raju Datla, Muhammad Hajj
13.10 - 13.30	Multivariate Modeling and Adaptive Control of Autonomous Ferries	Andreas Aurlien, Bjørn-Olav H. Eriksen, Morten Breivik	Vision-based net-pose estimation for autonomous operations in aquacultural fish cages	Christian Schellewald, Eleni Kelasidi, Annette Stahl
13.30 - 13.50	An Underwater Photogrammetric Application to Generate Micro-Bathymetry Data for Benthic Habitat Mapping and Analysis at Arctic Ocean	Amin Mardani Nejad, Thomas Luhmann, Thomas P. Kersten, Autun Purser, Boris Dorschel	Few-Shot Open World Learner	Andreas Langeland Teigen, Aya Saad, Annette Stahl, Rudolf Mester
13.50 - 14.10	Lightweight Underwater Visual Loop Detection and Classification using a Siamese Convolutional Neural Network	Antoni Burguera	CIRAL: a hybrid active learning framework for plankon data labeling	Martin Lund Haug, Aya Saad, Annette Stahl
14.10 - 14.30	Application of Teams of USVs for Cyanobacteria Monitoring: Initial Steps	Jose M Giron-Sierra, Jesús Chacón	Side-Scan Sonar Imaging: Real-Time Acoustic Streaming	Jesper Haahr Christensen, Lars V. Mogensen, Ole Ravn
Break				
14.45 - 16.30	**Closing:** Prof. Dr.-Ing. Axel Hahn & Prof. Dr.-Ing. Torsten Jeinsch			